Material models as recorders of academic communities: A new project on university collections in Germany

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Abstract

Transdisciplinary research on university collections is most rewarding. Such studies give insights into the history and the origin(s) of collections and knowledge as well as the material culture of universities. From this perspective, material models in university collections are excellent objects for study. In their dual role as both products and sources of scientific knowledge, models are key instruments of science. Until today, however, a full historical overview of the three-dimensional models employed across the different scientific branches has not been compiled. Against this background, the recently launched project "Material models in teaching and research: Indexing, documentation and analysis of models in university collections" can be considered a seminal research contribution to scientific material culture. It systematically records and documents three-dimensional models in German academic collections, and presents them via a globally accessible multimedia online-database. This article will provide a brief overview of the initial steps and results of this project and recommend transdisciplinary research as a possibility of promoting academic interest in university museums and collections.

Introduction

In 2004, a small team of researchers at Helmholtz Center for the Kulturtechniken, an interdisciplinary center of the Humboldt University of Berlin, started a project headed by the author on *University museums and collections in Germany* to enable transdisciplinary studies which open up a rewarding view on university collections. The aim was to catalogue German university collections and to compile extensive data on the holdings and history of these collections, in order to form a basis for specific research on the history and the origin(s) of collections and knowledge as well as the material culture of universities. The project was officially completed in 2009.[1]

Today, the Helmholtz Center provides not only an online survey on the national university holdings with more than 1,000 collections, it also gives information on the different object groups present in the collections: chemical material, geological material, animals, plants, human remains, artifacts etc. Historically, the priorities of university collections have been research and university teaching. Therefore, they retain complete categories and groups of material unavailable elsewhere in the public sector which means that these holdings are unique and of great importance, in particular, for research. One of these object groups is three-dimensional models.

The new project *Material models in teaching and research: indexing, documentation and analysis of models in university collections* started in summer 2010.[2] It aims at the development and maintenance of an online information system which presents material models from different universities and disciplines. In their double role as both products and sources of scientific knowledge, models are key instruments of science (REICHLE, SIEGEL & SPELTEN 2008; DIRKS & KNOBLOCH 2008). Until now, however, a comprehensive historical overview of the material models employed across the different scientific branches has not been compiled. The systematic recording and documentation of these models in academic collections, which includes their presentation via a globally accessible multimedia online-database can therefore be considered a seminal research contribution to scientific material culture.

[1] www.universitaetssammlungen.de/ (accessed September 15, 2011).
[2] www.universitaetssammlungen.de/modelle (accessed September 15, 2011).

Academic collections are particularly suited for such a project since the material sources used in and produced by teaching and research have largely been preserved. Consequently, they provide researchers with a representative range of models covering disciplines, types and times (DE CHADAREVIAN & HOPWOOD 2004). The documentation and analysis of model collections which have up to date remained invisible to the public will not only make available new important resources for research on scientific and cultural history, but also underline the importance of such objects as cultural goods worth preserving.

The model database is integrated in the already established information system on university museums and collections in Germany that serves as a starting point for further research. Later, we want to add additional object groups if funding is obtained.

Preliminary considerations

The idea of this project is based on the following considerations:

1. The number of objects kept in university collections is unknown. Many collections are not accessible and even the documented material is mostly registered on record cards, in inventory books or local databases and, therefore, not open to the public and available for global research and teaching.

2. University collections hold millions of objects. Therefore, it seems to be prudent to set limits and focus on particular object groups. In this way, it is possible to document heterogeneous holdings independent of disciplines and times, but with thematically closely connected objects and standardized vocabularies.

3. The maintenance of university collections is often inadequate. For the digital documentation there is – in the majority of cases – a lack of the essential technical, personal and financial resources and the relevant knowledge on information science particularly in the numerous small collections. The development of a comprehensive information system that jointly opens up, documents and presents the available resources is thus not just reasonable, but also most efficient. For instance, mass produced objects, which are kept in several collections, do not have to be described several times. For all the other objects it will be sufficient to verify the existent holdings. The greatest advantage, however, is that curators and collection managers do not have to deal with technical and methodical questions. Instead, they can concentrate on the opening up of their assets. For this purpose curators and collection managers can use a professional information system, which does not focus on a single collection, but tries to document the different academic holdings on a transdisciplinary perspective. This is of a great benefit for research and teaching.

4. The online information system provides gateways, so that meta data can be imported in supra regional access systems (e.g. in *Europeana*, a multi-lingual online collection of millions of digitized items from European museums, libraries, archives and multi-media collections[3]).

Model types

Material models serve highly diverse functions in research and education. On the one hand, they represent theories as well as aesthetic and educational standards. On the other hand, they are important tools of scientific research practice as experimental models. Furthermore, they belong to a broad spectrum of disciplines and represent very different object types. For example, the database documents models of theatre stages, planets, ships, brains, and so on. This diversity requires a classification that acknowledges the differences between object types. The database defines eight

[3] www.europeana.eu/portal/ (accessed September 15, 2011).

thematic groups which are associated with different information structures and make it possible to take this diversity into account:

- Theatre and stage design models
- Ethnographic models
- Landscape models
- Mathematical models
- Models of buildings and civil engineering structures
- Models of organisms and biological systems
- Models of machines, vehicles, tools, and instruments
- Models of physical, chemical, and crystal structures

The database provides information profiles based on the association of models with specific thematic groups. If a model is linked to the thematic group ‘organisms and biological systems’, its database entry provides topic-specific options. For example, the user can associate a biological or medical model with a taxon, a specific organ, a type of disease, and so on. If a model is linked to the thematic group ‘buildings and civil engineering structures’, other options such as the type or the location of the building will become available.

The database

The database is still under construction but already open for the public. The structure we have implemented is as follows:

A. General information
B. Formal description
C. Description of (model) contents
D. (Description of) Reference object
E. Inventory evidence
F. Internal

A. General information
    a. Title in German (+ Model name in optional languages*): Modell der "Royal George" von 1715* / *Ship Model "Royal George" from 1715* / *Modélisme naval "Royal George" du 1715*
    b. Original name: *Modell eines Dreideckers*
    c. Photograph (incl. information on copyright holder) or picture gallery
    d. External links (website[s] with further information if available)
    e. Given options: Individual model, group or series (multiple individual models forming an overall model, e.g. organic development series)
    f. Model type (e.g. mathematical model or model of living organisms and biological systems)
    g. Last update of information

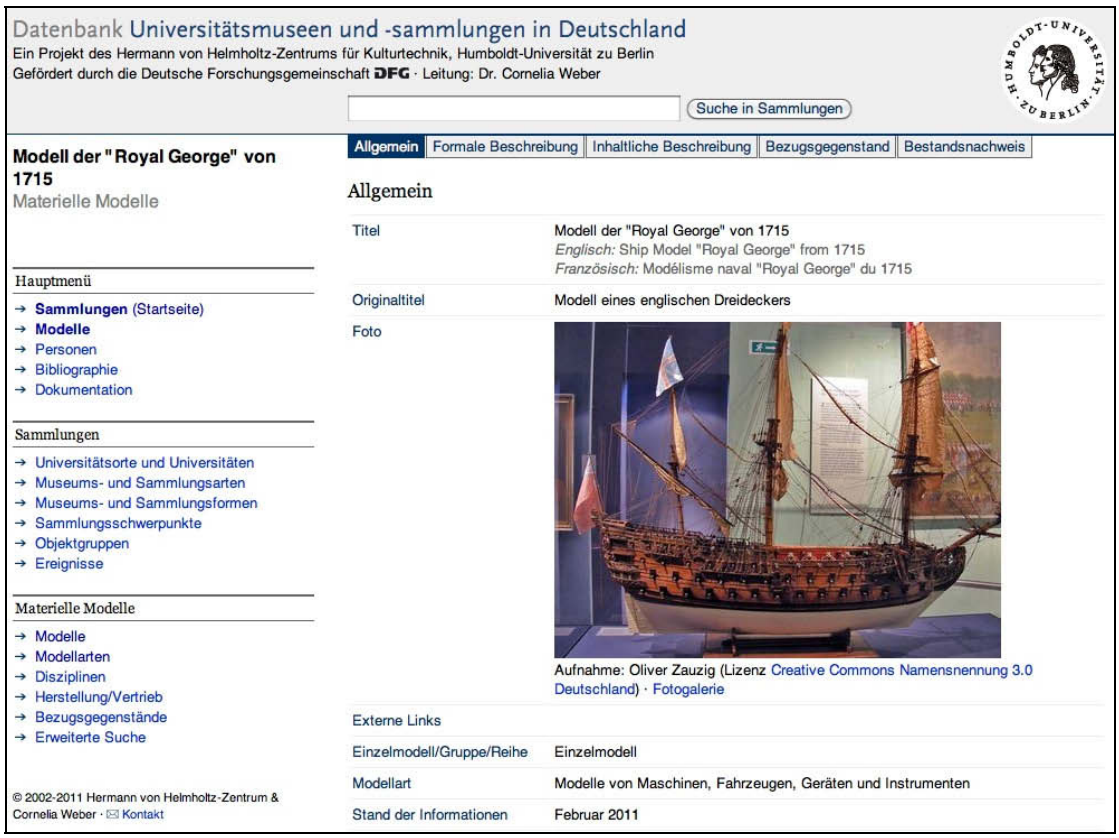


Fig. 1 - General Information: Ship Model "Royal George" from 1715

B. Formal description
   a. Scale (enlargement / reduction / no scale / original size)
   b. Size (width x height x depth)
   c. Weight (gram / kilogram
   d. Material (plaster, wood, glass etc.)
   e. Method of production (hand craft / industrial)
   f. Mode of production (series production / individual production)
   g. Given options: static or flexible/dynamic (yes/no)
   h. Given options: demountable – not demountable – one piece

Fig. 2 - Formal Description

C. Description of contents
   a. Area of research / discipline (e.g. geography)
   b. Designated use (e.g. tutorial, experimentation)
   c. Year of production
   d. Place of production
   e. Production / Distribution (linked to the people or corporation database)
   f. Further information on the model
   g. Publications (linked to the bibliographic database)
   h. Archive material (sales catalogues, drawings etc.)

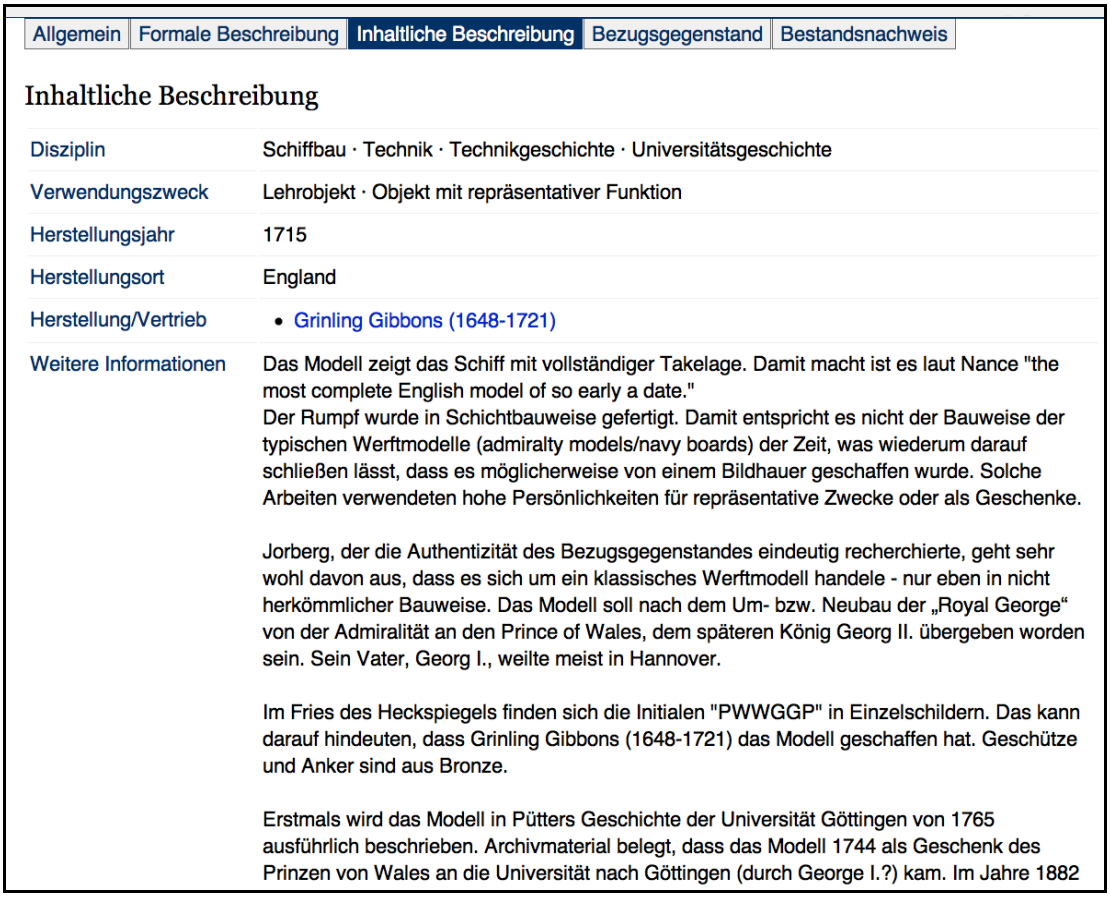
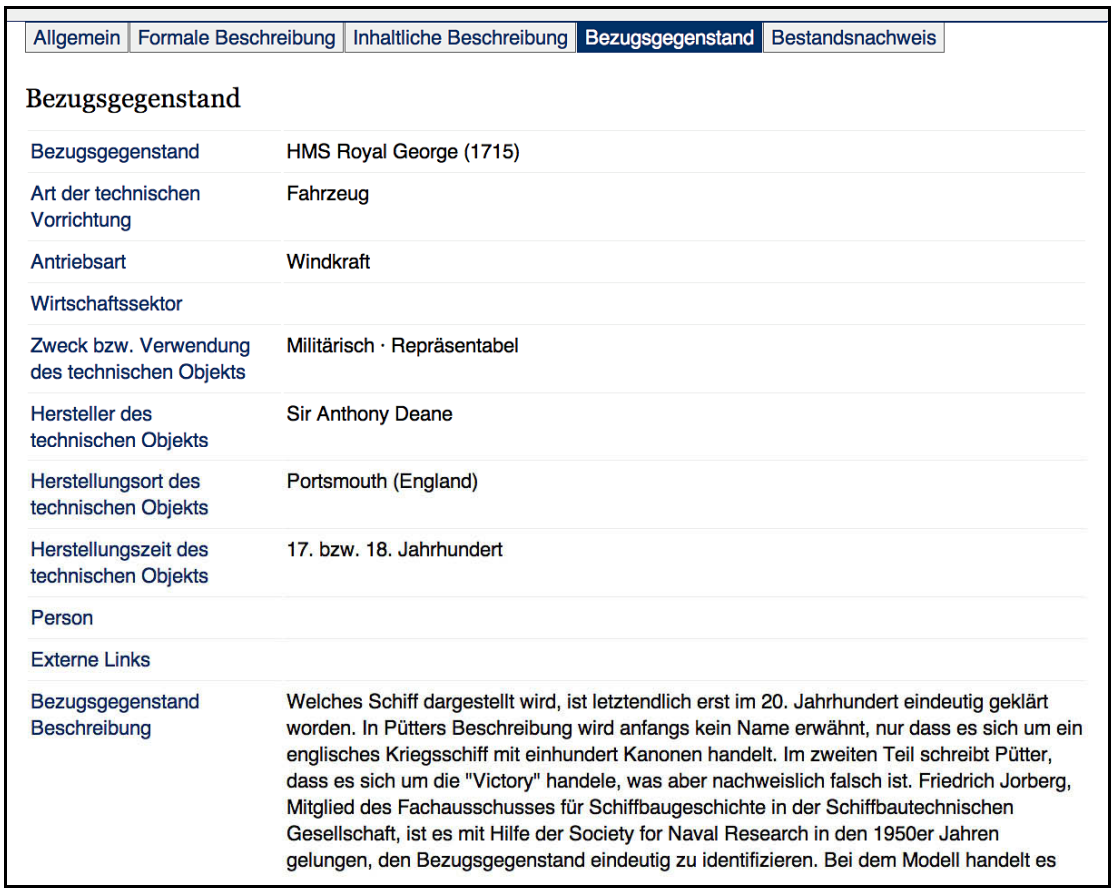


Fig. 3 - Description of contents (top part)

D. Reference object (dependent on the model type)
   Example: Models of machines, vehicles, apparatus and instruments
   a. Reference object
   b. Type of device
   c. Kind of propulsion
   d. (Kind of) Commercial sector
   e. Purpose or use
   f. Producer
   g. Place of production
   h. Date of production
   i. (Involved) Person
   j. External links
   k. Description of the reference object



Allgemein | Formale Beschreibung | Inhaltliche Beschreibung | **Bezugsgegenstand** | Bestandsnachweis

Bezugsgegenstand

Bezugsgegenstand	HMS Royal George (1715)
Art der technischen Vorrichtung	Fahrzeug
Antriebsart	Windkraft
Wirtschaftssektor	
Zweck bzw. Verwendung des technischen Objekts	Militärisch · Repräsentabel
Hersteller des technischen Objekts	Sir Anthony Deane
Herstellungsort des technischen Objekts	Portsmouth (England)
Herstellungszeit des technischen Objekts	17. bzw. 18. Jahrhundert
Person	
Externe Links	
Bezugsgegenstand Beschreibung	Welches Schiff dargestellt wird, ist letztendlich erst im 20. Jahrhundert eindeutig geklärt worden. In Pütters Beschreibung wird anfangs kein Name erwähnt, nur dass es sich um ein englisches Kriegsschiff mit einhundert Kanonen handelt. Im zweiten Teil schreibt Pütter, dass es sich um die "Victory" handele, was aber nachweislich falsch ist. Friedrich Jorberg, Mitglied des Fachausschusses für Schiffbaugeschichte in der Schiffbautechnischen Gesellschaft, ist es mit Hilfe der Society for Naval Research in den 1950er Jahren gelungen, den Bezugsgegenstand eindeutig zu identifizieren. Bei dem Modell handelt es

Fig. 4 - Reference object

E. Inventory evidence
    a. Name of collection (usually linked to the collection database or to an external collection)
    b. Permanent depository
    c. Current depository
    d. Special status (e.g. missing, orphaned)
    e. Inventory numbers
    f. Old inventory number
    g. Object rights
    h. Restoration / Conservation condition
    i. Use (e.g. presentation, exhibit)
    j. Provenance
    k. Acquisition date
    l. External links
    m. Other

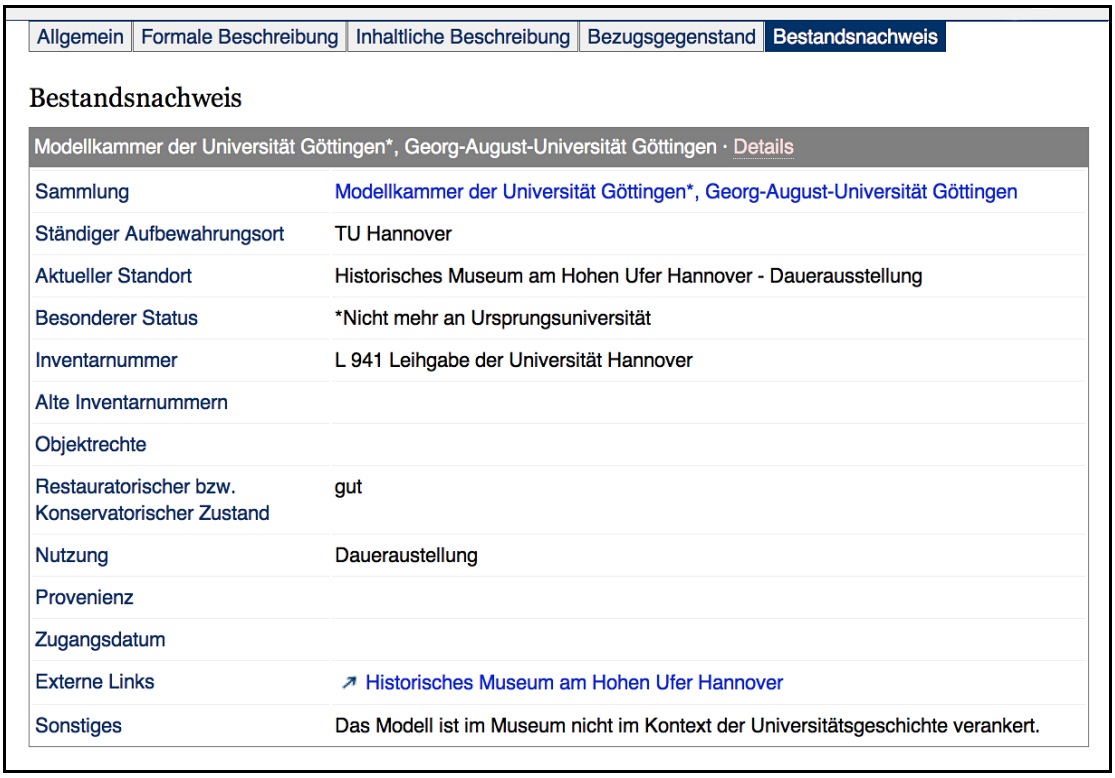


Fig. 5 - Inventory evidence

F. Internal (for various information concerning the workflow)

The main page offers several data-recall facility tools: a full-text search and different indices as well as a combination of various model characteristics:

- Index model types
- Index disciplines
- Index production/distribution
- Extended search (full-text, reference object, type of model, discipline, production/distribution, material, etc.)

Additional details are available via separate databases:

- Literature database
- People database

The literature database contains publications regarding the registered objects. The people database offers bibliographic data of people with relations to the objects: academics, technicians, preparators, model makers, instrument makers, etc.

Fig. 6 - Main page

Closing remarks

The development work is already completed and the system is open for everybody who wishes to enter data: researchers, curators and collection managers. It is intended to finish the data base project in summer 2012. Thereafter, it will be a great source for all kinds of research. In this way we can not only promote research on 'things that talk' (DASTON 2008) but also on university museums and collections in general.

The concentration on specific object groups is not only an appropriate way to open up university collections, it is also an efficient method to enable comprehensive transdisciplinary research on important holdings. Therefore, we should try to pursue an international database for specific object groups such as material models or devices in academic collections worldwide.

Literature cited

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